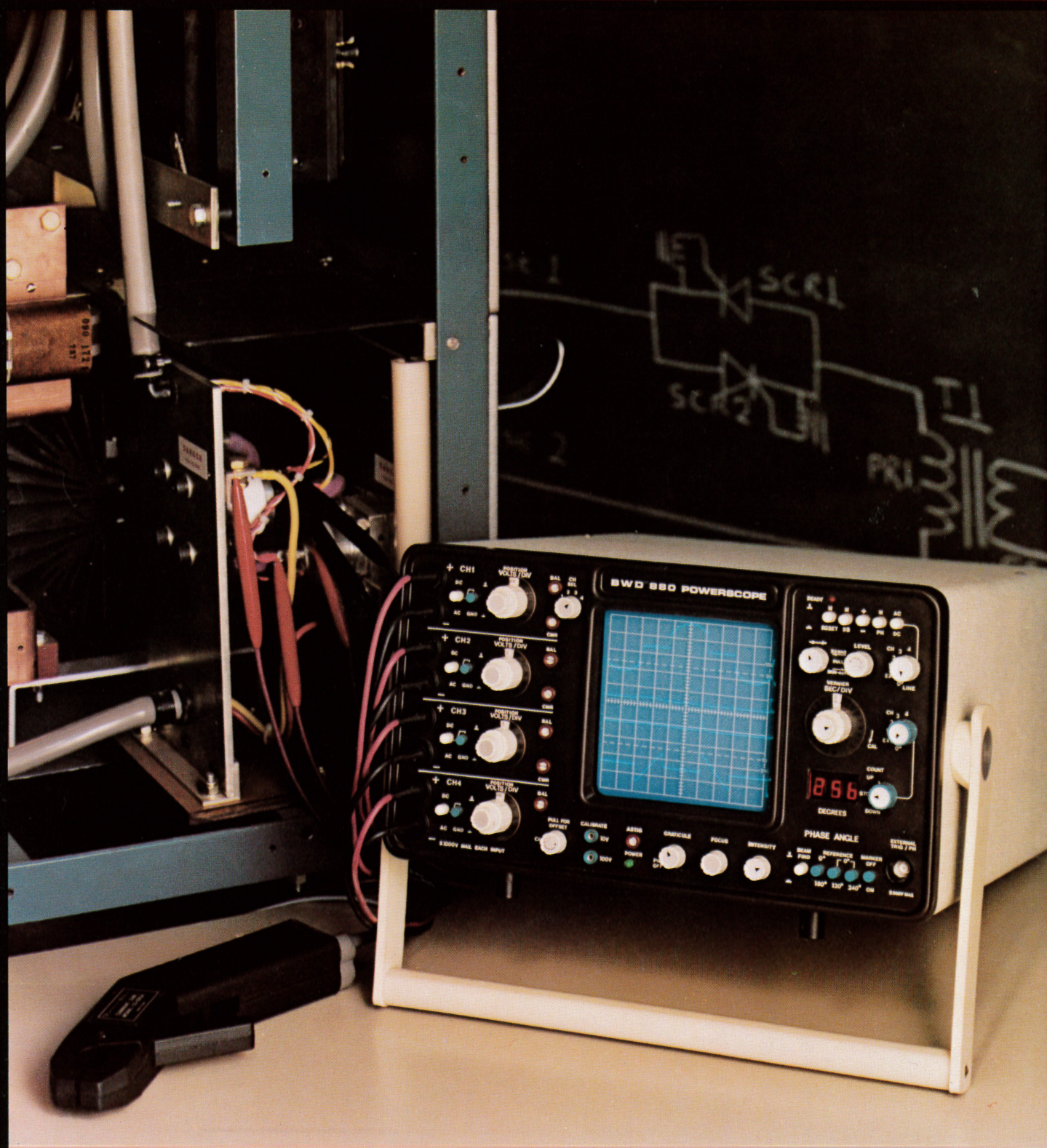


BWD

A new Oscilloscope Concept

880 POWERSCOPE



BWD Oscilloscopes — Australian — made to measure

Powerscope is a new class of oscilloscope dedicated to measurement in the field of Electrical Engineering and Power Control. **Powerscope** removes the frustrating limitations of conventional measurement technology by its ability to provide precise visual display of waveforms associated with AC and DC power engineering easily and with a very high degree of operator safety.

Powerscope Summary

4 Channels, differential input.
350V rms common mode rejection.
50nSec rise time.
100mV/div. maximum sensitivity to 200V/div. without divider probes.
Digital phase measurement from 0° to 359° in 1° steps.
0°, 120°, 180°, 240°, & 300° reference.
100nSec to 10Sec/div. time base range.
Digital phase trigger delay.
AC, DC or Battery operation.
10 x 10cm CRT, 6KV EHT.
Nett weight 12.5kg.

Completely insulated controls and panel for hazard free operation. Manufactured to IEC 348 recommendations.

Excellent performance as a general purpose oscilloscope with 4 channel differential input. DC to 7.5MHz amplifiers. Comprehensive time base and trigger facilities including identical X-Y operation and TTL compatible Z modulation.

Powerscope Capability

Display 4 simultaneous, independent waveforms with signal levels up to 660V rms ($\pm 1000V$) without external divider probes.

Measure differentially signal levels down to 100mV p-p in 600V rms 2 or 3 phase supplies or 350V rms single phase supplies.

Measure turn on and off times up to 50nSec of fast switching or commutating circuits. Provide $\pm 150V$ of input voltage offset on one channel for detailed analysis of large amplitude waveforms.

Display and measure phase of displayed waveforms from 25Hz to over 2000Hz from 0° to 359°.

Provide trigger or phase signals from any amplifiers channel, external or line (via precision zero cross over detector).

Operate from single or 2 phase AC supplies. DC or a rechargeable battery pack—the battery charger is built in. Complete portability for field servicing.

Amplifiers

Channels:

Four (Ch. 1, 2, 3 & 4).

Modes:

Alternate or Chopped at 500KHz.

Display: Switch selection of Ch. 1 only, 1 & 2, 1, 2 & 3 or 1, 2, 3 & 4.

Bandwidth: DC or 5Hz (AC coupled) to 7.5MHz—3db (6 div. ref).

Rise Time: 50nSec over 8 div. defl.

Sensitivity: 100mV to 200V/div. 11 steps 1, 2, 5 sequence.

Calibration: < 5%.

Input: 1M Ω and 8pf each side, to ground of differential input.

Max. Input: $\pm 1000V$ or 660V rms. 3KV peak overload for 1 second.

Common Mode Rejection: > 20,000:1 at maximum sensitivity. Panel preset to optimise CMR.

Max. Common Mode Input: 350V rms ($\pm 500V$).
0.1 to 10V/div. 600V rms 20 to 200V/div. At 0.1V/div. 250V rms appears as < 4mm deflection and < 1mm at 0.5V/div. or greater.

Input Offset: Ch. 4 only. Variable over $\pm 150V$ for increased resolution of high voltage waveforms.

X-Y Operation: Single channel identical sensitivity X-Y display. DC to 500KHz-3db. < 3° phase shift DC to 30KHz.

Phase Generator

Range: Selectable in 1° steps from 0° to 359° by a 5 position switch providing up-down counting at a 2° or 10° per second with centre stop position.

Readout: In degrees on a 10mm 3 digit LED display.

Frequency Range: 25Hz to > 2000Hz. Operation is automatic with a response time of < 0.5 Sec. for a 10% frequency change.

Outputs: (available simultaneously):
(i) 1° wide bright-up degree marker and 'winking' ref. marker on CRT display.
(ii) Trigger pulse for time base.
(iii) 6V pulse at rear panel socket.

0° Reference: Push button selection at 60° intervals from 0° to 300° with respect to zero cross-over point of selected source. Reference point is displayed by a 'winking' marker.

Marker Pulse Jitter: < 0.5° with 0° or 180° reference. < 1° with 120° or 240° reference.

Marker Pulse Accuracy: < 1° from 40Hz to 400Hz increasing to < 2° from 25Hz to 1KHz and $\leq 5^\circ$ at 2KHz.

Source: Ch. 1, 2, 3 or 4, external or via zero cross-over detector from oscilloscope input power line.

Phase Resolution: < 0.5° between (for example) trigger pulses in 2 or 3 phase circuits.

Time Base

Range: 0.5 μ Sec to 2Sec/div. in 21 steps at 1, 2, 5 sequence. A vernier control covers the range between steps and extends range to > 10Sec/div.

Magnification: x1 & x5
Maximum sweep speed 100nSec/div.

Calibration: < 3% at x1 and < 5% at x5 mag.

Trigger:

Source, Ch. 1, 2, 3 or 4, external, AC line or zero cross-over detector.

Coupling, DC or AC.

Polarity, $\pm$ with level selection over 10 div. internal, or 50V p-p external with 1:1 probe or 500V p-p with 10:1 probe.

Modes, Auto, Level Select and Single Sweep with manual or triggered initiation. Ready lamp indicates state of trigger under all conditions.

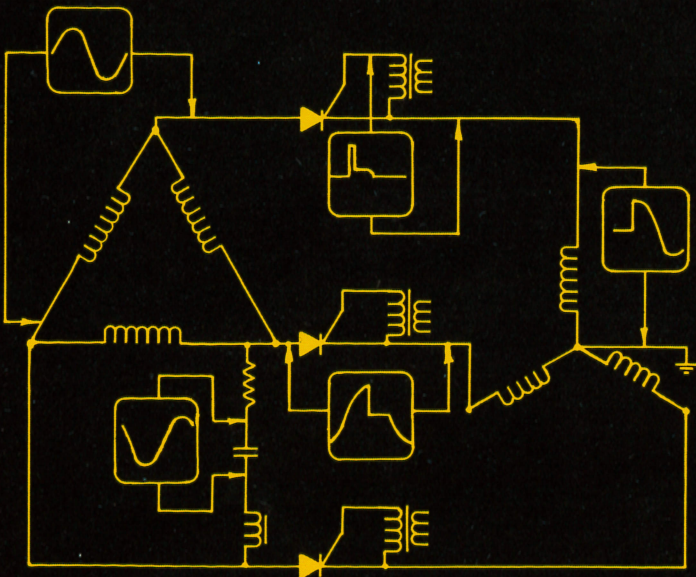
Sensitivity:
Int: 1 div. or greater DC to 7.5 MHz
Ext: 3V p-p or greater DC to 7.5 MHz

Delay Trigger: Phase pulse provides trigger delay in 1° steps from 0° to 359° with digital readout.

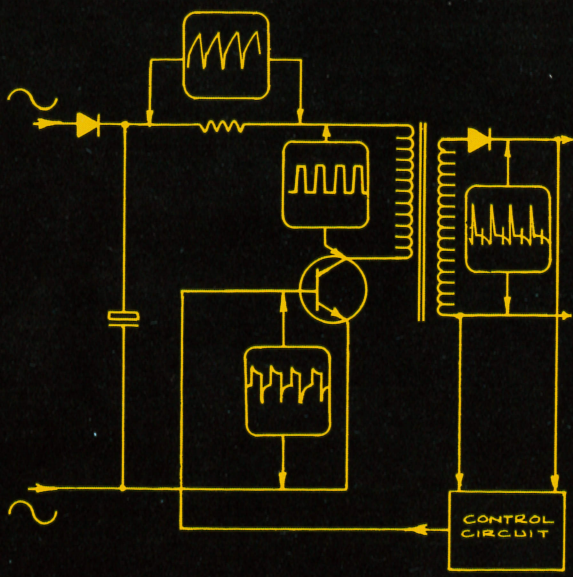
External Input: 1M Ω & 8pf.

Maximum Input: $\pm 500V$ DC or 350V rms up to 1KHz decreasing to 100V rms at 1MHz.

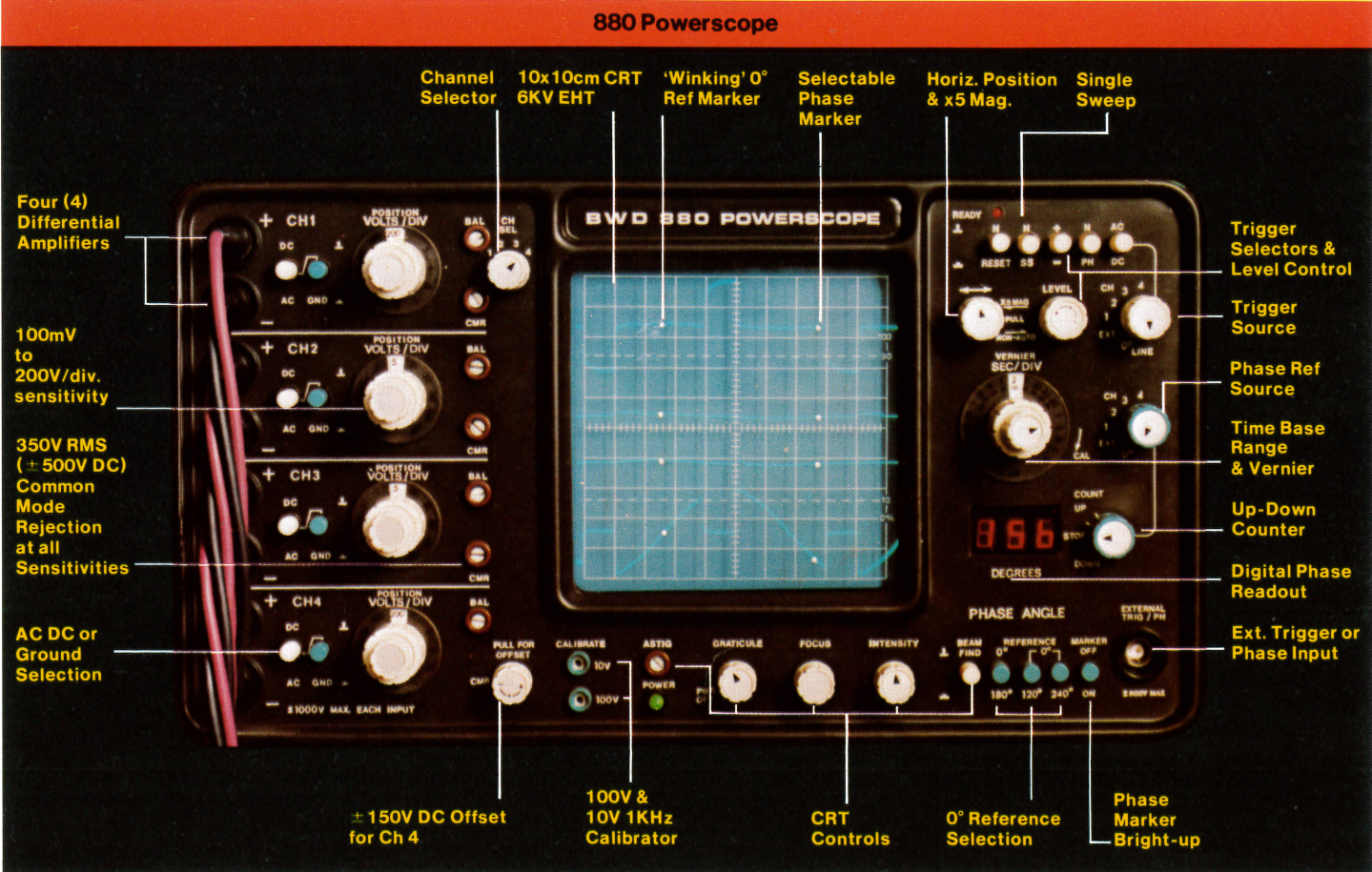
Typical Applications include the Simultaneous Display of 4 Independent Phase Related Waveforms.



Multiphase measurements supply voltages up to 600V rms between phases



Single phase up to 350V rms and DC to $\pm 500V$.



Input Sockets: (Front panel)	Special snap fit shrouded, high voltage. Adaptors (BWD A8) will accommodate standard BNC connectors for all input sockets.
Output signals:	Phase pulse: Coincident with phase bright up marker. Pulse width 1°. Amplitude +6V falling to 0V, 10K Ω source resistance. Calibrator: 1KHz (approx.) rectangular wave +10V and +100V with respect to ground. Accuracy 2% at 10V, 3% at 100V into a > 1M Ω load (+5°C to +40°C). Time Base Gate: +4V falling to 0V for duration of trace. 10K Ω source impedance.
Z Modulation:	+5V with respect to ground will blank trace at normal intensity. Bandwidth: DC to > 10 MHz. Input 10K Ω . Maximum input $\pm$ 50V.
Beam Finder:	Push button returns trace to within limits of CRT screen and over-rides intensity control.
CRT:	Square 10 x 10 div. (1 div.=1cm) operating at 6KV EHT. Fitted with variable edge illuminated graticule and blue filter. Normally supplied with P2 phosphor. P7 available as option/04.
Power Requirements:	AC, 98 to 135 Volt and 195 to 270 Volt. Selection by changeover switch. 48 to 2000Hz 50 watts max. 340V to 610V 2 phase, 48 to 400Hz available as a detachable option/A9. DC, 20 to 30 Volt at 1.5 amps. Battery pack BWD BP8 (optional) 3 hours per recharge. Battery charger incorporated in standard instrument. Recharging from AC or 32 Volt DC.
Low Voltage Indicator:	When the voltage supply to the oscilloscope (AC, DC or battery) falls below correct operating level the front panel indicator changes from a steady to a flashing mode.
Safety Standards:	Instrument closely conforms to IEC 348. In addition the entire operating section, controls, panel, etc., are insulated and front panel sockets are deeply recessed.
Environmental:	Specification is met, within power supply range shown above, from +0°C to +40°C and from 0% to 80% RH unless otherwise stated. Add 2% to percentage specifications for operation 40°C to 50°C 80% to 90% RH. Storage—20°C to +70°C and 0% to 90% RH.
Finish:	Dark brown moulded front panel with contrasting cream and blue controls and sand coloured vinyl covered cabinet.
Dimensions and Weight: (Shown with Battery pack)	Weight Nett: Instrument 12.5kg Battery Pack 6.5kg Packed: Instrument 16kg Battery Pack 8kg. Dimensions in mm
Warranty:	Instrument is guaranteed for a period of 12 months from date of purchase against faulty materials and workmanship.
Accessories Supplied:	4 x 1:1 type P80 & 4 x 10:1 type P81 probes. Instruction manual, 1 detachable power cord fitted with an IEC 6A 250V plug.
Ordering Code:	Standard instrument: BWD 880. Fitted with options: BWD 880/option number e.g. BWD 880/04 (P7 CRT).
Options:	Battery Pack/BP8. Two phase stepdown transformer and mounting 340-610V, 48-400Hz. Option A9. P7 CRT. Option 04.
Optional Accessories:	1:1 Probe, 1.5 metres unscreened. Red or black, spring hook. BWD P80/R or BWD P80/B. 10:1 probe, 1.5 metre cable. 3KV peak working BWD P81. Special BNC to Standard BNC Adaptor BWD A8. Folding Viewing Hood BWD H80. Dust Cover BWD D80. Front Panel Protective Cover BWD SC80. Carrying Case BWD C80. Oscilloscope Trolley BWD T61 Cameras—Details on request.
Battery Pack:	The type BWD BP8 Battery pack is readily attached or detached from 880 Powerscope. It is fixed by two screws and connects via a plug to the rear panel socket. If desired the battery pack can be carried separately by means of its own handle. Recharge time of 14 hours provides approximately 3 hours running time.

Designed and Manufactured by
BWD Electronics Pty Ltd



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Sold and Serviced by:
BWD Electronics Pty. Ltd.
and authorised national and
international representatives.
With a policy of continuous development,
variations in technical detail may occur.